

# LCN Fund Full Submission

## Supplementary Answer Form

Tick if this answer is Confidential: ☐

Tick if this answer has been provided verbally: ☐

| Project code:                          | UKPNT205  | Question Number | UKPNT205-16       |                       |             |                  |  |               |   |
|--|---|-----------------|-------------------|-----------------------|-------------|------------------|--|---------------|---|
| Question date                          | 12 September 2013   | Answer date     | 16 September 2013 |                       |             |                  |  |               |   |
| Submission section question relates to | Appendix H – Cost Benefit Analysis  |                 |                   |                       |             |                  |  |               |   |
| Topic                                  | CBA   |                 |                   |                       |             |                  |  |               |   |
| Question                               | Please outline the approach to energy saving devices and energy shifting.   |                 |                   |                       |             |                  |  |               |   |
| Notes on question                      |   |                 |                   |                       |             |                  |  |               |   |
| Answer                                 | <p>The efficiency potential savings from household appliances and load shifting potential were investigated by Element Energy at the request of UK Power Networks. Findings were based on the Household Electricity Usage Study (HEUS) household report that was undertaken on behalf of DECC and DEFRA that collected data from 250 households. <i>Source: DECC, Defra and the EST (2012), "Household Electricity Survey: A study of domestic electrical product usage".</i></p> <p>The HEUS households were distributed across fifteen Experian Mosaic Groups. For V-CEE we focused on two that we believed to be the closest match to the V-CEE targeted socio-demographic groups, 'fuel poor' and 'vulnerable':</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 30%;">Experian Mosaic Group</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>Claimant Culture</td> <td>Families reliant on benefits living in low-rise council housing where there is widespread disadvantage</td> </tr> <tr> <td>Elderly Needs</td> <td>Elderly people who are reliant on support either through specialised accommodation or the basic state pension</td> </tr> </tbody> </table> <p><b>Table 1:</b> Experian Mosaic Groups related to targeted V-CEE trial participants</p> |                 |                   | Experian Mosaic Group | Description | Claimant Culture | Families reliant on benefits living in low-rise council housing where there is widespread disadvantage | Elderly Needs | Elderly people who are reliant on support either through specialised accommodation or the basic state pension |
| Experian Mosaic Group                  | Description   |                 |                   |                       |             |                  |  |               |   |
| Claimant Culture                       | Families reliant on benefits living in low-rise council housing where there is widespread disadvantage  |                 |                   |                       |             |                  |  |               |   |
| Elderly Needs                          | Elderly people who are reliant on support either through specialised accommodation or the basic state pension   |                 |                   |                       |             |                  |  |               |   |

It should be noted that the HEUS households had two limitations / deviations to UK trends:

1. Fairly low representation from the 'claimant culture' and 'elderly needs' Experian Mosaic Groups.
2. HEUS households were limited to easily accessible owner-occupiers in England. Therefore, no social housing tenants captured.

This does not impact the validity of using this data. It was the best available information in the UK for research for the vulnerable and fuel poor. This places great value in the LCNF funding V-CEE as it can deliver a wealth of insight, based on academic research and trial demonstration, on vulnerable and fuel poor's' interaction with smart metering, energy efficiency techniques and DSR and subsequent network impacts that is currently not available.

#### **Household appliances:**

V-CEE will focus on four key appliance categories:

| <b>Appliance type</b>           | <b>HEUS report measured the electricity that could be saved annually by:</b>                            | <b>In scope of V-CEE</b> | <b>Notes</b>  |
|---------------------------------|---|--------------------------|---|
| <b>Cold appliances</b>          | Replacing all cold appliances with class A+ or A++ equipment.   | No                       | V-CEE will not be assisting up-rating of appliances to A+ or A++.   |
| <b>Lighting</b>                 | Replacing all incandescent and halogen light bulbs with compact fluorescent lights (CFL) bulbs.         | Yes                      | V-CEE has proposed a CFL bulb as one of the energy saving devices to be provided to trial participants.   |
| <b>Standby power</b>            | Reducing all standby power for the audio visual and computer sites.                                     | Yes                      | V-CEE has proposed to provide trial participants a TV standby saver and Timer Socket. Also the project will supply advice to participants to encourage households to turn things off themselves when they are not using them. |
| <b>Wet appliances</b>           | Replacing existing washing machines, clothes dryers and dishwashers with energy efficient alternatives. | Yes                      | V-CEE will not replace existing appliances but will provide time switches on washing machine sockets, tariffs and education materials.  |
| <b>Computing</b>                | Replacing desktop computers with laptops.   | No                       | V-CEE will not be assisting the upgrade of desktops to laptops. We are offering devices to limit their standby power as detailed above.   |
| <b>Water Heating appliances</b> | N/A   | Yes                      | V-CEE will provide time switches, tariffs and education materials.  |

**Table 2: Key appliance categories**

### Energy Efficiency Potential Savings

The Element Energy study investigated the annual household appliance efficiency potential. This study determined the technical potential to be:

| Total UK appliance efficiency savings potential                | Total UK appliance efficiency savings by Table 1 Experian Mosaic Groups |               | Per household savings potential by Table 1 Experian Mosaic Groups |               |
|--|---|---------------|---|---------------|
| 15.4 TWh/year<br>i.e. 14% of total UK domestic electricity use | Claimant Culture  | Elderly Needs | Claimant Culture  | Elderly Needs |
|  | 0.5 TWh/year  | 1.0 TWh/year  | 353 kWh/year  | 655 kWh/year  |

**Table 3:** Energy efficiency potential savings

### Load Shifting Potential Savings

Assumptions:

- assumed that the electricity usage arising from certain appliance types can be shifted to varying degrees around peak usage periods.
- focused on fully shiftable appliances (washing machines, tumble dryers, dishwashers and water heating) as well as partially shiftable cold appliances because they offered the clearest potential for shifting from a socio-technical perspective.
- depending on the appliance type being considered, various fractions of the peak load (from 6-7pm) were assumed to be movable to lower demand periods:

| Appliance type                  | Type:  | In scope of V-CEE | Fraction of appliance peak-time load that can be shifted |
|---------------------------------|--|-------------------|--|
| <b>Cold appliances</b>          | Fridges and freezers.  | No                | 9%   |
| <b>Wet appliances</b>           | Washing machines, tumble dryers and dishwashers.                   | Yes               | 100%   |
| <b>Water heating appliances</b> | Household hot water and electric showers but not including kettles | Yes               | 100%   |

**Table 4:** Assumption for fraction of peak load assumed to be moveable to lower demand periods

|   |  |   |               |   |               |
|---|--|---|---------------|---|---------------|
|   | The Element Energy study investigated the load shifting potential to be:   |   |               |   |               |
|   | Total domestic UK load shifting potential  | Total domestic UK load shifting potential |               | Per household load shifting by Table 1 Experian Mosaic Groups |               |
|   | 1.99GW   | Claimant Culture                          | Elderly Needs | Claimant Culture  | Elderly Needs |
|   |  | 0.1GW                                     | 0.04GW        | 64W   | 25W           |
|   | <b>Table 5:</b> Load shifting potential  |   |               |   |               |
|   | <i>*Note: There has been an update to elderly needs with a refresh on washing appliance load =&gt; 0.01GW difference in total domestic UK potential to our final bid submission.</i> |   |               |   |               |
| Attachments                             |  |   |               |   |               |
| Verbal Clarifications<br>(Consultants ) |  |   |               |   |               |